

APPENDIX E: CD-C RECLAMATION FOR ALTERNATIVES B, D, AND F

Table of Contents

PART I: INTRODUCTION AND RECLAMATION CRITERIA	E-1
Reclamation Goals, Objectives, and Principles	E-1
Reclamation Success Criteria	E-2
PART II: RECLAMATION PRACTICES	E-3
Phases of Reclamation	E-3
PART III: RECLAMATION MONITORING AND REPORTING	E-8
Types of Monitoring Required	E-8
Reclamation Reporting	E-9
PART IV: RECLAMATION OF ROADS AND PIPELINES	E-12
Information Specific to Roads and Pipelines	E-12

APPENDIX E—CD-C RECLAMATION FOR ALTERNATIVES B, D, AND F

This page is blank for 2-sided printing.

This appendix addresses reclamation practices for the CD-C project area and is applicable to Alternatives B, D, and F. This plan will be implemented by the Operators to achieve successful reclamation on federal lands disturbed by natural gas operations within the CD-C project area. Appendix M describes reclamation practices for the CD-C project area applicable to Alternative C.

The 2015 Approved Resource Management Plan Amendment for Greater Sage-Grouse (ARMPA, BLM 2015b) calls for separate reclamation guidance in Priority Habitat Management Areas (PHMAs). Reclamation in the 160,000 acre PHMA within the CD-C project area under the Proposed Action and all alternatives will be guided by the Reclamation Plan found in Appendix M of the ARMPA. It can be accessed at: https://eplanning.blm.gov/epl-front-office/projects/lup/9153/63202/68444/015_Wyoming_ARMPA_Appendix_M_Reclamation-Plan.pdf

In addition to the above guidance, the requirements outlined in Appendix 36 of the Rawlins Field Office (RFO) Resource Management Plan (RMP), the Bureau of Land Management (BLM) Wyoming State Reclamation Policy, and the BLM Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM 2006) will be adhered to. Operators are responsible for the reclamation of surface disturbance in accordance with federal regulations and the standards outlined in Onshore Oil and Gas Order #1 and the Federal Land Policy Management Act (FLPMA).

The project area consists largely of the sagebrush steppe ecosystem. This ecosystem is characterized by limited soil resources, low precipitation, and predominantly shrub and grass vegetation communities. The project area has a harsh arid climate, receives approximately 6-10 inches of precipitation per year, is situated at 6,300-7,800 feet, and has a short growing season. Soils are often thin with little to no organic matter, low water holding capacity, and/or have undesirable chemical properties. These conditions can make vegetation re-establishment difficult, with marginal success from basic reclamation efforts.

Procedures presented in this plan are designed to allow flexibility based on specific conditions encountered at each proposed disturbance site. All criteria and requirements presented in this plan pertain to all disturbances in the CD-C natural gas development area, including well pads, pipelines, roads, and ancillary facilities.

PART I: INTRODUCTION AND RECLAMATION CRITERIA

Reclamation Goals, Objectives, and Principles

The Wyoming State BLM Reclamation Policy focuses on 10 requirements which apply to all surface disturbing activities. These requirements must be addressed for all proposed disturbances in site specific reclamation plans (SSRPs), which are submitted to the BLM with the project proposal and must be approved by the BLM prior to implementation of the project.

The 10 requirements of the Wyoming State BLM Reclamation Policy are as follows:

1. Manage all waste materials
2. Ensure subsurface integrity, and eliminate sources of ground and surface water contamination
3. Re-establish slope stability, surface stability, and desired topographic diversity
4. Reconstruct and stabilize water courses and drainage features
5. Maintain the biological, chemical, and physical integrity of the topsoil and subsoil (where appropriate)
6. Prepare site for re-vegetation
7. Establish a desired self-perpetuating native plant community
8. Re-establish a complementary visual composition
9. Manage invasive plants
10. Develop and implement a reclamation monitoring and reporting strategy

The goal of reclamation in the project area is to return the disturbed land to a condition approximate to or better than that which existed before disturbance, by restoring plant cover and species composition of the site to its pre-disturbance direction (BLM 2008). To accomplish this goal, the lease operators and right-of-way holders should design reclamation efforts to include the establishment of a self-sustaining, diverse vegetation community comprised of species native to the region, in sufficient density and diversity that approximates a natural, undisturbed vegetation community.

In order to facilitate reclamation, the following fundamental reclamation assumptions will be the basis of the site specific and science-based reclamation approaches that will be used in the CD-C project area:

1. Reclamation success will be based on setting reasonable, achievable, and measurable reclamation goals that are representative of the conditions in the CD-C area.
2. Soil is the basic building block of successful reclamation.
3. In the CD-C project area, approximately 50 percent of the soils are classified as sensitive (saline, sodic, sandy, very shallow, clayey).
4. Adaptive management principles will be used to adapt to changing environmental conditions that may occur during the reclamation process.

Reclamation Success Criteria

Reclamation success criteria are necessary to measure reclamation performance and success, and to ensure that disturbed lands are being reclaimed in an appropriate manner and timeframe. The Wyoming BLM Reclamation Policy identifies both a short term and long term goal for reclamation:

1. Short-term: immediately stabilize disturbed areas and provide conditions necessary to achieve the long-term goal.
2. Long-term: facilitate eventual ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan.

Interim reclamation occurs following construction of a well pad and is concentrated on areas of the well pad that are no longer required during the operational period of the well. Final reclamation occurs once disturbance of the area is complete and facilities have been removed. Disturbances such as pipelines will immediately proceed towards final reclamation; disturbances such as well pads or compressor stations will initially focus on interim reclamation and, once operations cease and infrastructure is removed, will continue towards final reclamation.

Interim reclamation success criteria in the CD-C project area have been identified and are as follows:

1. All vegetation on the disturbed site must be desirable perennial species as represented by the seed mix or reference site species or as deemed desirable by the BLM in review and approval of the site specific reclamation plan.
2. Vegetation basal cover should be 70 percent of pre-disturbance or reference area basal cover.
3. Invasive weeds or other undesirable species will comprise no more than 10 percent of the total vegetative cover; no noxious weeds will be allowed.
4. Erosional features should be equal to or less than the adjacent area.
5. In years 3–6:
 - a. A seedling density of 3 to 4 seedlings per foot of drill row or transect should occur. In some areas such as badlands, sodic and/or saline/alkaline soils, this standard may be reduced to one to two seedlings per foot to be commensurate with the naturally low vegetative cover, unless significant surface erosion is anticipated and will be at the discretion of the BLM.
 - b. A species diversity of at least 50 percent of the species contained in the seed mix and/or present on adjacent areas will be present, and no single species will account for more than 50 percent of the total vegetative cover unless its dominance is higher than 50 percent on adjacent undisturbed areas.

Final reclamation success criteria should incorporate the short term and long term goals in order to address the spatial and temporal aspects of reclamation. Final reclamation success criteria in the CD-C project have been identified and are as follows:

1. Pre-disturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition should occur. The vegetation will consist of 80 percent of pre-disturbance (or reference site) ground cover and 90 percent dominant species, no noxious weeds. Erosion features will be equal to or less than the surrounding area, the pre-disturbance survey, or approved reference sites.
 - a. The vegetation will consist of species included in the seed mix and/or occurring in the surrounding natural vegetation or as deemed desirable by the BLM in review and approval of the site specific reclamation plan. No single species will account for more than 30 percent total vegetation composition unless it is evident at higher levels in the adjacent landscape. Vegetation canopy cover, production and species diversity shall approximate the surrounding undisturbed area.

PART II: RECLAMATION PRACTICES

Phases of Reclamation

In general, the life cycle of a natural gas related disturbance is composed of 4 to 5 stages, which correspond with the 4 to 5 stages of reclamation:

1. Pre-disturbance planning and site preparation
2. Facility construction
3. Interim reclamation (if applicable e.g. pipelines transition right to final reclamation)
4. Final reclamation,
5. Reclamation maintenance

1. Pre-Disturbance Planning and Site Preparation

Pre-disturbance planning and careful attention to site layout are the first steps to optimizing reclamation success, and are used to develop the SSRP. In addition, pre-disturbance planning and inventory aids in the identification of any issues, such as sensitive soils, steep topography, or invasive species that may reduce the potential for successful reclamation. Decisions made during this phase of a project can facilitate reclamation efforts through the use of Best Management Practices (BMPs) to minimize the extent and severity of project-related environmental impacts.

a. Pre-disturbance site selection

Consideration of topography, geology, and micro-climate during the planning phase can facilitate re-contouring efforts and aid in reclamation. For example, a site on a south-facing slope might indicate that more drought tolerant species should be selected than if the site is on a north-facing slope.

Sites should be constructed to maximize the area that will be re-contoured during the interim reclamation phase. Designing disturbances to be the minimum size needed to safely conduct operations will minimize the amount of re-contouring and reclamation required on the site.

The ability to rapidly meet reclamation objectives and satisfy reclamation performance standards may be limited by the vegetation community for a given site. Sites that consist of woody shrubs may require a longer period to achieve successful reclamation when compared to a site composed primarily of grass species. During planning, the vegetation composition of a potential site should be carefully considered.

Pre-disturbance planning of operational and reclamation activities will be important in minimizing impacts on critical wildlife habitat and other resources. It may be necessary to schedule activities to occur

at times outside of breeding or migrating periods, for example. Modified reclamation practices (such as special seed mixes) may be recommended for areas with unique habitat conditions.

Areas such as alkali flats, badlands, dunes, rocky outcrops, or other such sites can be exceedingly difficult or infeasible to reclaim. These areas can have highly erodible soils, steep slopes, low precipitation, and/or other physical, biological, and/or chemical limitations. Because reclamation in these areas is more difficult, such sites should be avoided if possible. In addition, avoidance areas stipulated in the RMP include:

- i. Areas with high erosion potential, including rugged topography and steep (>25 percent) slopes
- ii. Area with saturated soils
- iii. Within 500 feet of perennial drainages, ponds, lakes, wetlands, playas, or riparian areas; and
- iv. Within 100 feet of ephemeral and intermittent drainages

b. Pre-disturbance soil salvage planning and soil inventory

The Wyoming State BLM Reclamation Policy (BLM 2012) specifies that the biological, chemical, and physical integrity of the topsoil and subsoil must be maintained. The following points are emphasized in the policy:

- i. Identify, delineate, and segregate all topsoil and subsoil, using site specific soil evaluation and testing if necessary or required.
- ii. Protect all stored soil material from erosion, degradation, and contamination.
- iii. Incorporate stored material into the disturbed landscape.
- iv. Seed soils to be stored beyond one growing season with desirable vegetation.
- v. Identify stockpiles with appropriate signage.

Suitable soils have physical and chemical characteristics favorable for plant growth, including soil depth, pH, electrical conductivity, texture, surface features, and organic matter content. Incorporation of unsuitable materials in the soil stockpile will impair plant growth, and potentially affect successful reclamation. A site specific soil evaluation should be used to investigate and characterize the site's soils in order to obtain sufficient information to develop the site specific soil salvage plan; fundamental characterization of soils ahead of disturbance can identify potential problems. The BLM will determine on a site specific basis whether a proposed location requires a site specific soil evaluation. Soil characteristics that may hinder successful reclamation include:

- i. Soils with a pH of 8.4 or higher or a pH lower than 6.0
- ii. No suitable soil or very shallow suitable soil, less than 3 inches in depth
- iii. Soil solutions with an electrical conductivity (EC) greater than 8 dS/m
- iv. Sodium Adsorption Ratio (SAR) of 13 or higher when pH is greater than 8.4 and EC is greater than 4 dS/m
- v. Soil textures of clay, sand, or loamy sand
- vi. Surface and subsurface soil in and through the root zone dominated by coarse material greater than 2 mm in diameter and greater than 40 percent of the soil profile

The site specific soil evaluation should evaluate depth as well as physical and chemical characteristics of the soil(s) encountered at the site. Site specific soils data and the soil salvage plan for the site, along with photographs of the soil pit(s) and vegetation community, should be included in the SSRP that is submitted with the project proposal. If deemed necessary by the BLM specialists' onsite inspection, further soil testing will be required. Soils testing and reports will be the responsibility of the Operators.

c. Baseline vegetation assessment

Gathering vegetation data before a site has been cleared documents pre-disturbance site conditions and in turn guides reclamation decisions. Seed mixes should be based on desirable vegetation that has historically grown on-site and return of cover should be gauged by comparison with actual pre-

disturbance site conditions and/or reference areas. The following vegetation characteristics can signal a high probability of reclamation problems:

- i. The presence of halophytes, e.g. saltbush
- ii. The presence of alkali halophytes, e.g. greasewood, halogeton
- iii. The presence of noxious or invasive species, e.g. cheatgrass, Russian thistle, Russian knapweed, halogeton

Methodologies used to determine the information for the vegetation inventory are included in BLM guidelines for vegetation sampling: Sampling Vegetation Attributes, Interagency Technical Reference (1996). This document can be found online at: <http://www.blm.gov/nstc/library/pdf/sampleveg.pdf>.

d. Reference site selection

A reference site is a land unit which is representative, in terms of physiography, soils, vegetation, and land use history, of an area that is to be disturbed. Reclaimed sites are compared to reference sites to determine successful interim and final reclamation. In Wyoming, a site may be comprised of multiple ecological communities (e.g. dunes, alkali flats, and sagebrush). Ecological variation at a given site can make it difficult to evaluate which adjacent area should serve as a reference. A reference site should be chosen based upon the pre-disturbance assessment and the identified dominant community on the site. One reference site for a proposed disturbance site with more than one ecological community may not be suitable. A reference site located adjacent to the site to be disturbed, with similar soils, vegetation, and aspect should be chosen. Any use of a reference site must have prior authorization by the BLM.

e. Site Specific Reclamation Plan

Onshore Oil and Gas Order #1 and the FLPMA both require that the proponent submit either Plans for Surface Reclamation (Onshore Oil and Gas Order 1.III.D.4.j) or proposed construction and reclamation techniques, respectively (43 CFR 2804.12(a)(3)); these are collectively known as site specific reclamation plans (SSRPs). The Wyoming State BLM Reclamation Policy (BLM 2012) provides more detail on the standards that the BLM requires project proponents to meet when surface disturbing activities are permitted. The SSRP is required for all disturbances, and should incorporate information collected during the pre-disturbance site assessments and present a strategy that considers both interim and final reclamation, including reclamation monitoring, reporting, and maintenance. The reclamation plan should describe the pre-disturbance soil and vegetation for the site in addition to other parameters such as topography, hydrology, and other characteristics that are relevant to reclamation of the site. The plan should provide an ecological site classification, a seed mix recommendation appropriate for the classification, a topsoil salvage plan, and other site specific conditions. Reclamation monitoring for interim and final reclamation should also be addressed in the plan.

The SSRP should also include a description of site preparation activities that prepare a site for re-vegetation activities. In general, these activities include replacement of stockpiled suitable and unsuitable soils, re-establishment of a stable subsurface environment, re-contouring, soil compaction relief, and incorporation of soil amendments. The SSRP should also include considerations of how surface stability will be achieved, including:

- i. Redistribution of the soil materials in a manner designed to optimize re-vegetation
- ii. Relief of soil compaction of the re-distributed soil to an appropriate depth
- iii. Reconstruction of pre-disturbance topography, including:
 - o Re-establishment of pre-disturbance contour
 - o Elimination of high walls, cut slopes, or topography depressions on site
 - o Reconstruction of drainages and reclamation of impoundments to maintain the drainage pattern, profile, and dimension to exhibit similar hydrologic characteristics approximate to pre-disturbance function
- iv. Minimization of wind, sheet, and rill erosion on and/or adjacent to the reclaimed area
- v. Use of BMPs such as erosion matting as appropriate to protect seed and seedling establishment

Proposed seed mixes and seeding methods should be presented in the SSRP; the plan will describe when seeding will occur and specify the method by which seeding will occur, e.g. broadcast or drilling. Seeding depth should also be specified.

Providing multifunctional and sustainable seed mixes for interim and final reclamation is necessary for increasing the potential for successful and timely re-vegetation and site stability. Plant diversity and habitat functionality are influenced by the seed choices applied to an area slated to be reclaimed. Appropriate native plant materials should be selected based on the pre-disturbance vegetation survey, site characteristics, and/or ecological site description. Seeds may be obtained from commercial sources, certified weed-free seed mixes, or local collections provided they are collected in areas without invasive species.

Soil amendments may be used in reclamation if the soil is lacking necessary chemical, biological, physical, or organic materials to support growth of suitable plant materials; all uses of soil amendments must be approved by the BLM prior to application and/or use. Any proposed soil amendments must be described in the SSRP, and should include:

- i. What the application of identified soil amendments is intended to accomplish
- ii. Which amendments will be applied
- iii. What method of application will be used
- iv. The timing of application relative to other reclamation practices

Soil amendments should be selected based on the pre-disturbance and/or existing soil characteristics and scientific recommendations. Any BMPs that will be used during site construction and reclamation must also be described in the SSRP. Approval of the SSRP will be required by the BLM prior to implementation. Upon review of the proposed project, the BLM will provide Conditions of Approval (COAs); these conditions may modify the approach included in the SSRP. Requirements for notification of timelines to complete specific reclamation activities may be specified in the COAs.

2. Facility Construction

The objective of reclamation during the construction phase is to salvage suitable soil identified in the soil salvage plan and segregate it from less desirable subsoil to ensure that construction activities do not hinder future reclamation of the site.

a. Soil Salvage Operations

Prior to soil salvage, removal of large woody vegetation may be required. Woody materials salvaged during clearing should be piled outside of the disturbed area and not mixed or buried in the soil stockpiles. Salvaged woody materials should be stored for use during reclamation activities. Grasses, forbs, and small woody vegetation such as sagebrush should be salvaged along with the suitable soil and stockpiled. Suitable soil should be salvaged from all disturbed locations where surficial soils are considered suitable prior to placement of non-suitable soil fill. This should include the footprints of any stockpile locations where non-suitable soil will be placed (such as material excavated during construction of a reserve pit).

The pre-disturbance soil salvage plan described above is the basis for soil salvage activities during site construction. Stockpile locations and soil salvage depth are specified in the plan. Soil salvage depth may vary in the different areas delineated in the plan. On some sites a constant soil salvage depth may be specified for the entire location. The area of stripping should include all locations identified in the pre-disturbance soil salvage plan, including areas where non-suitable soils will be stockpiled. Soil salvage operations typically utilize wheel tractor-scrapers. However, equipment selection may be influenced by factors such as ground condition or topography where use of track dozers, haul trucks, and loaders may be more practical. Regardless of the type of equipment used, care should be taken to follow the stripping depth recommendations provided in the soil salvage plan. Over-excavation during soil stripping may negatively alter the quality of salvaged soils and reduce the potential for reclamation success.

b. Soil Stockpile Management

The salvaged soil will be stockpiled at the edge of the site for later use during interim and final reclamation. The stockpile locations are required to be identified in the project proposal. Stockpile dimensions should be designed to accommodate the required volume and, to the extent possible, the area of the stockpiles should be minimized in order to reduce the overall project disturbance. Separate stockpiles are required to be provided for soils that are determined to be suitable for reclamation purposes, and non-suitable soils that may have been excavated during reserve pit or flare pit construction. These separate stockpiles should be labeled with appropriate signage.

During interim reclamation, topsoil can be re-spread; a portion of the suitable soil stockpile can be set aside for final reclamation. The volume of soils to be saved should be approximately equivalent to the ratio of the final area to be reclaimed to the maximum area of disturbance. Stockpiles should be protected from erosion, degradation, and contamination. Salvaged soils that are suitable for reclamation purposes and that will be stored beyond one growing season should be seeded with desirable vegetation to control erosion and weeds.

3. Interim Reclamation

The goal of interim reclamation is to stabilize portions of disturbed sites no longer subject to disturbance from ongoing activities. For example, interim reclamation may occur in the perimeter area of a natural gas well site while the inner portion of the site is still used for production. Interim reclamation objectives include stabilizing the disturbed soil surface, controlling runoff and erosion, and establishing native vegetation.

Specific reclamation practices that may be used during interim reclamation are described in more detail in Attachment A, Reclamation Practices.

4. Final Reclamation

Final reclamation will be conducted on areas where all operations have ceased and no further disturbance will occur. For example, final reclamation is required once a well has reached the end of its productive life and all equipment is removed from the location. During final reclamation, site stabilization and vegetation establishment will take place after recontouring on any remaining disturbed portions of the well pad not previously addressed during interim reclamation. This usually consists of an area in the well pad center that contained the wellhead, equipment, and vehicle turn around area, in addition to the access road. Final reclamation measures are designed to achieve compliance with the ten reclamation requirements stipulated by the BLM Wyoming Reclamation Policy (BLM 2012), the Approved RMP for the RFO, and the specific success criteria presented in this plan.

5. Reclamation Maintenance

Reclamation maintenance ensures that vegetation, site stabilization, and other measures function properly until achieving successful reclamation. Successful final reclamation may take many years and success will vary depending on site specific conditions. Regular reclamation maintenance may be necessary to identify and solve potential reclamation issues. Reclamation monitoring, as described later in this document, will provide annual feedback on whether to conduct special reclamation maintenance inspections and develop site specific reclamation maintenance prescriptions.

Reclamation maintenance techniques and site specific maintenance prescriptions may include, but are not limited to:

Forensic soil/vegetation investigations

- a. Inter-seeding or spot seeding
- b. Re-seeding
- c. Fertilizer or other soil amendment applications
- d. Weed control

- e. Compaction relief
- f. Erosion control devices and BMPs
- g. Wildlife and/or livestock exclusion fences
- h. Snow fences for collecting moisture

PART III: RECLAMATION MONITORING AND REPORTING

Types of Monitoring Required

Monitoring determines whether disturbed sites are meeting reclamation success criteria, and is conducted to observe and record environmental conditions at the reclaimed site. Monitoring also documents development of the reseeded plant community, invasive species, soil stability, and ecosystem function. Continued characterization after disturbance is appropriate for monitoring site maturation and stability, particularly when problematic soil conditions or invasive weeds are identified. Monitoring also provides the data necessary for tracking disturbances in the project area. Mapping of disturbance areas and results of monitoring should be entered into a database tracking worksheet. This worksheet provides an accounting of the disturbances on an annual basis and will be maintained by the BLM. Vegetation monitoring and disturbed site evaluation for any component of the reclamation plan may take place at intervals agreed to by the BLM and the Operator; generally, the intervals for monitoring and reporting will be set annually unless otherwise agreed to as a condition of approval of the reclamation plan.

The Operator will inspect well pads, access roads, pipeline rights-of-way, and other disturbed areas associated with natural gas development in the CD-C project area. The assessment will include status of re-vegetation, erosion control, and weed control efforts at each site. Monitoring personnel should be experienced in plant identification, soils, and range management. Success monitoring should be conducted during the peak growing season (late May through July) in order to minimize the effect of seasonal fluctuations in plant life cycles and to ensure that the majority of plant species will be identifiable. Operators may elect to conduct additional monitoring as necessary.

Monitoring will evaluate the following:

1. Location status (reserve pit, cover soil stockpile, seeding status)
2. Basal cover of vegetation by species on site
3. Basal cover of vegetation by species in native range adjacent to site
4. Seedling counts by species for recently seeded disturbances in the first growing season
5. Extent of rock, litter, and bare ground
6. Noxious and invasive weed infestations
7. Grazing severity
8. Wildlife and/or livestock use
9. Evidence and extent of erosion
10. Effectiveness of erosion control measures
11. Reclamation maintenance recommendations

Operators may use any BLM-approved method to collect the necessary basal cover, plant species, ground cover, and erosion data. More information is available online at <http://www.blm.gov/nstc/library/pdf/sampleveg.pdf>.

Seedling counts should be conducted for recently seeded disturbances using a quadrat covering a minimum of one-half square meter. At least ten quadrats should be located on the disturbed area. These quadrats may be located along two or more 50-foot long transects, or randomly located throughout the disturbed area.

Grazing severity should be recorded as none, low, moderate, or high using the following criteria (BLM 1996):

1. None: 0–5 percent utilization. The key species show no evidence of grazing use or negligible use.

2. Low: 5–40 percent utilization. The key species may be topped, skimmed, or grazing in patches. Between 60 and 95 percent of current seed stalks remain intact. Young plants are undamaged.
3. Moderate: 40–60 percent utilization. Approximately half of the available forage (by weight) on key species appears to have been utilized. Fifteen to 25 percent of current seed stalks remain intact.
4. High: 60–100 percent utilization. Approximately 60 percent or more of the available forage on key species appears to have been utilized. Less than 10 percent of the current seed stalks remain. Shoots of rhizomatous grasses are missing. There may be indications of repeated use. There may be no evidence of reproduction or current seed stalks. The remaining stubble may be at the same level of the soil surface.

If there is evidence of grazing, the wildlife, wild horse, and/or livestock usage is identified based on fecal matter present on the site and should be recorded as one of the following:

1. Wildlife
2. Livestock
3. Wild horses
4. All
5. Unknown

Based on the field evaluation, monitoring personnel will recommend any necessary reclamation maintenance. During annual monitoring, crews should establish one permanent photo point at each site and record the location using GPS. At each photo point, field personnel should take five photographs: four standing at the photo point and facing in each of the cardinal directions and one close-up of the soil surface from approximately 1.5 meters above. Field personnel should also take additional photographs that document any unusual conditions. These include, but are not limited to, distinct areas within the location where re-vegetation has failed, weed infestations, high grazing use, soil crusting, salt precipitation, and uncommon plant species.

Monitoring should also evaluate soil erosion characteristics using the Erosion Condition Classification System (reference), which includes the following:

1. Site aspect
2. Slope gradient (percent) range
3. Photographs and notes
4. Rills (small erosion rivulets)
5. Gullies
6. Flow patterns
7. Pedestals
8. Surface rock fragments
9. Surface litter
10. Soil movement

When a disturbance is not in the stable category using this method, monitoring crews should note observations on erosion features present and make recommendations for corrective actions.

Reclamation Reporting

Operators will submit results of disturbed area tracking, annual monitoring, and reclamation implementation/maintenance to the BLM on an annual basis by December 1st for the previous year..

Operators will provide the BLM with a GIS layer of all disturbance areas on an annual basis, due on December 1st. The GIS data layer will be accompanied by metadata sufficient to describe the data attributes, coordinate system, and methods. Attributes included in the data layer will include:

1. Location name
2. Unique identifier

APPENDIX E—CD-C RECLAMATION FOR ALTERNATIVES B, D, AND F

3. Operator
4. Type of disturbance (well pad, seeded area, roads, pipelines, etc.)
5. Disturbance data
6. Area
7. Reclamation stage (not reclaimed, interim reclamation, final reclamation)

Monitoring results should be provided to the BLM annually by each Operator in a tabular, digital format and must include the following information:

1. Location name
2. Unique identifier
3. Operator
4. Date of most recent monitoring
5. Method of sampling vegetation
6. Percent basal vegetation cover of grass, forbs, shrubs, weeds, and cover crops on site
7. Percent litter, rock, and bare ground cover on site
8. Percent basal vegetation cover of grass, forbs, and shrubs off site
9. Percent litter, rock, and bare ground cover off site
10. Recommended reclamation maintenance

Operators will calculate the following from the above data:

1. On site desirable basal cover (Grass + Forb + Shrub)
2. Off site desirable basal cover (Grass + Forb + Shrub)
3. Basal cover of disturbed area vegetation as percent of basal cover of undisturbed vegetation
 - $(\text{Disturbed Area Grass} + \text{Forb} + \text{Shrub basal cover}) / (\text{Undisturbed Area Grass} + \text{Forb} + \text{Shrub basal cover})$

To request concurrence from the BLM that a location or multiple locations meet reclamation success criteria, Operators should prepare a separate report. Monitoring data must show that the location has met reclamation success criteria for at least three consecutive years. This report must be provided to the BLM by December 1st for the previous year's locations, and should discuss the Operator's reasoning and provide site specific data and photographs. This will include vegetation monitoring data to the species level.

For reclamation earthwork, the following will be reported:

General	WYW# (Oil and Gas Lease or ROW)
	Project Name
	Project Type (Well, Access Road, Pipeline, Facility, etc.)
	Qtr/Qtr Sec, T, R, County, State
Disturbance	Disturbance Dates
	Start-End
Reclamation	Reclamation Type (Interim/Final)
	Earthwork Contractor Name
	Earthwork & Topsoil Completion Date
	Soil Preparation Ripping Depth
	Area (Acres or Square Feet)

APPENDIX E—CD-C RECLAMATION FOR ALTERNATIVES B, D, AND F

Seeding	Seeding Contractor Name
	Seeding Date
	Seedbed Preparation Methods (Disc, Harrow, Depths)
	Seeding Method (Drill, Broadcast, Depths)
	Copy of Seed Tag (Species %, Purity %, Germination %)
	Actual Seeding Rate (Lbs/Acre)
	Area Seeded (Acres or Square Feet)
Other	Soil Amendments Used (Describe)
	Mulching/Erosion Netting/Tackifier
	Fenced Location
	Snow Fencing
Weeds	Type(s) of Weed Treated
	Weed Contractor Name
	Contractor License #
	Weed Treatment Date
	Weed Treatment Type (Chemical, Mechanical)
	Chemicals Used and Rates Applied
	Area Treated (Acres or Square Feet) (GIS Extent and Location)
Inspection	Inspector's Name, Company, ID
	Inspection Date
	Time After Seeding
	Seedlings/Square Feet Growing
	% and Extent of Bare Soil
	% Ground Cover (Describe)
	% Desirable Species (Describe)
	% Noxious/Invasive Weeds (Describe)
	Erosion Features Present? (Describe)
	Evidence of Livestock Grazing (Describe)
	Reclamation Successful (Yes/No)
Reporting	Completed Spreadsheet or Database
	GIS Layer With Attribute Table With Site Data as Detailed
	Detail Disturbance Extent and Location
Monitoring	Permanent Reference Point
	Reference Photos
	Close-Up Photos
Future Management Prescription	Reseeding
	Weed Control Needed
	Erosion control Needed
	Grazing/Predation Issues
	Other Cultural or Mechanical Needs

PART IV: RECLAMATION OF ROADS AND PIPELINES

Information Specific to Roads and Pipelines

To minimize disturbance associated with roads and pipelines, pipeline corridors would be partially contained within the road Right-of-Way (ROW) corridors, where practical. In addition, existing roads within the CD-C project area will be utilized to the maximum extent practical. Where roads and/or pipelines cross drainages, construction and installation operations would be designed to protect drainages and timed to coincide with periods of low flow (late summer, fall, or winter). Crossings would be perpendicular to flow, and removal and disturbance of riparian vegetation would be minimized. These areas would be disturbed in consultation with the U.S. Army Corps of Engineers (COE), when necessary, and reclamation of these areas would occur in accordance with COE requirements.

New roads would follow natural contours and would be constructed in accordance with BLM road standards (BLM 1991). Surface runoff control would be incorporated into all road designs in accordance with BLM standards and would be approved by the BLM. Road grades, ditches, culverts, sediment traps, material cuts and fills, and topsoil and spoil material storage areas would be designed and located in the field prior to construction. Road culvert locations and spacing would be approved by the BLM prior to construction and would be in accordance with BLM standards.

When constructing and reclaiming pipelines, existing crowned and ditched roads would be used for access, where practical, to minimize surface disturbance. Pipelines would follow new or existing roads or other pipelines, wherever practical. Pipeline trenches would not be placed in access road borrow ditches unless no other reasonable locations are available. Clearing of pipeline ROWs would be accomplished with the least amount of disturbance necessary. No construction activities would be allowed when soils are saturated or frozen without prior approval from the BLM.